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ART UNIT	**PAPER NUMBER**
1793	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	**Application No.**	**Applicant(s)**	
	10/718,961	BAMPTON, CLIFFORD C.	
	Examiner	**Art Unit**	
	TIMA M. MCGUTHRY-BANKS	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7,9-15,17-19 and 25-29* is/are pending in the application.

4a) Of the above claim(s) *26-29* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,9-15 and 17-19, 25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Newly submitted claims 26-29 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the product as in Claims 26-29, i.e. green part and/or sintered part, can be made by another materially different process, for example by sintering with an organic binder as taught in US 5,745,834.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 26-29 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Status of Claims

Claims 1, 4, 5, 9, 12, 13, 15, 18 and 19 are currently amended, Claims 8, 16, and 20-24 are cancelled, and Claims 25-29 are new.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al (US 6,719,948 B2) in view of Feldstein (US 5,248,475).

Lorenz et al teaches forming a skeleton or green part from powder metallurgy. Further processing includes using an infiltrant with a melting point depressant (MPD). The MPD

diffuses into the skeleton, the liquid undergoes a diffusional solidification and the material eventually solidifies. Regarding melting the alloying metal, the infiltrant has a composition similar to that of the skeleton (column 2, lines 32-48 and column 3, lines 16-23). The powder metallurgy process to make the skeleton produces a homogeneous net shape (column 3, lines 4-6). Titanium alloys can be used in this process (column 23, lines 45-50). The infiltrant is molten (column 3, line 29); the composition of the melt is established by, *inter alia*, separating the infiltrant from the melt prior to infiltration and adding excess skeleton material to the melt (lines 36-38). Regarding Claim 2, the alloying element with Ti includes Sn (column 23, line 52). However, Lorenz et al does not disclose the steps of spreading, directing, re-solidifying, and brushing as in Claim 1.

Feldstein teaches a method for fabricating a sintered and solid element. The steps include, *inter alia*, coating discrete pieces of an "unsinterable" material with an alloying agent, exposing the discrete pieces to heat so that localized melting occurs to form molten surfaces on the discrete particles, and removing the heat away from the element (column 5, lines 1-46). Regarding the step of spreading, Feldstein teaches packing the discrete particles onto a backing and supporting structure (column 5, lines 3-5), such as a substrate (column 6, lines 20 and 21). Regarding the step of directing, the step of exposing the discrete particles so that localized melting occurs reads on the claimed step. Regarding the step of resolidifying, heat is removed and the sintered and solid element is allowed to cool (column 5, lines 45 and 46). The heat source is not specified in Feldstein, but the disclosed controlled heating reads on an energy beam, since an energy beam is a source of heat, and Feldstein teaches the same result of localized melting. Regarding the step of brushing, it would have been obvious to one of ordinary

skill in the art at the time the invention was made to clean excess powder while fabricating a piece for further processing. Titanium-based alloys can be used with alloying agents such as Sn and Ni (lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the fabricating technique in Feldstein for the skeleton in Lorenz et al, since Feldstein teaches that the alloyed element concentration profile can be controlled, distribution is optimized, and costs of production are minimized (column 4, lines 11-18).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claims 1 and 2 above, and further in view of Rongti et al (2000).

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al view of Feldstein does not disclose the concentration of tin as claimed. Rongti et al discloses that Sn addition to Ti can improve the wetting behavior of Ti on substrates and discloses a composition of 10% Sn (pages 21 and 24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a 10% Sn composition as taught by Rongti et al in the alloy of Lorenz et al in view of Feldstein to improve wetting.

Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claims 1 and 2 above, and further in view of the CRC Handbook of Chemistry and Physics.

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein does not disclose the operating temperatures as claimed. The CRC Handbook discloses the melting temperature of Ti ($\approx$ 3020 °F) and Sn ($\approx$ 448 °F). It would have been obvious to one of ordinary skill in the art at the time the invention was

made that the operating temperature would be between the melting temperatures of Ti and Sn, since the alloying element melts and the main element, i.e. Ti, remains in the solid state.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claim 1 above, and further in view of Clement et al (US 6,223,976).

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein does not disclose the alloy concentration as claimed. Clement et al discloses a process for repairing and refacing titanium aluminide articles by preparing a mixture of powders consisting of 40-90% powder A and 10-2=40% powder B (abstract). Powder A is the same composition as the article to be refaced or repaired, whereas powder B is Cu15 Ni15, balance Ti (column 4, lines 13-59). An obvious advantage of the addition of the Ti-15Cu-15Ni alloy is the lower melting temperature relative to the alloys disclosed in Clement et al. This feature would enable repair and refacing to be made at a temperature less than that of the article to be repaired. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 10 and 40% of Ti-15Cu-15Ni as taught by Clement et al to the alloy composition of Lorenz et al in view of Feldstein to enable deposition to be made at lower temperatures.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein and Clement et al as applied to claims 1 and 6 above, and further in view of the CRC Handbook.

Lorenz et al in view of Feldstein and Clement et al discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein and Clement et al does not disclose the

operating temperature as claimed. The CRC Handbook discloses the melting temperature of Ti ($\approx$ 3020 °F) and Sn ($\approx$ 448 °F). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the operating temperature would be between the melting temperatures of Ti and Sn, since the alloying element melts and the main element, i.e. Ti, remains in the solid state.

Claims 9, 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein.

Lorenz et al teaches forming a skeleton or green part from powder metallurgy. Further processing includes using an infiltrant with a melting point depressant (MPD). The MPD diffuses into the skeleton, the liquid undergoes a diffusional solidification and the material eventually solidifies. Regarding melting the alloying metal, the infiltrant has a composition similar to that of the skeleton (column 2, lines 32-48 and column 3, lines 16-23). The powder metallurgy process to make the skeleton produces a homogeneous net shape (column 3, lines 4-6). Titanium alloys can be used in this process (column 23, lines 45-50). The infiltrant is molten (column 3, line 29); the composition of the melt is established by, *inter alia*, separating the infiltrant from the melt prior to infiltration and adding excess skeleton material to the melt (lines 36-38). Regarding Claim 10, the alloying element with Ti includes Sn (column 23, line 52). However, Lorenz et al does not disclose the steps of spreading, directing, re-solidifying and brushing as in Claim 9 or the size of the powder blend as in Claim 17.

Feldstein teaches a method for fabricating a sintered and solid element. The steps include, *inter alia*, coating discrete pieces of an "unsinterable" material with an alloying agent, exposing the discrete pieces to heat so that localized melting occurs to form molten surfaces on

the discrete particles, and removing the heat away from the element (column 5, lines 1-46). Regarding the step of spreading, Feldstein teaches packing the discrete particles onto a backing and supporting structure (column 5, lines 3-5), such as a substrate (column 6, lines 20 and 21). Regarding the step of directing, the step of exposing the discrete particles so that localized melting occurs reads on the claimed step. Regarding the step of resolidifying, heat is removed and the sintered and solid element is allowed to cool (column 5, lines 45 and 46). The heat source is not specified in Feldstein, but the disclosed controlled heating reads on an energy beam, since an energy beam is a source of heat, and Feldstein teaches the same result of localized melting. Regarding the step of brushing, it would have been obvious to one of ordinary skill in the art at the time the invention was made to clean excess powder while fabricating a piece for further processing. Titanium-based alloys can be used with alloying agents such as Sn and Ni (lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the fabricating technique in Feldstein for the skeleton in Lorenz et al, since Feldstein teaches that the alloyed element concentration profile can be controlled, distribution is optimized, and costs of production are minimized (column 4, lines 11-18).

Regarding Claim 17, the discrete pieces in Feldstein can be from particles to chopped pieces of fiber, wire, platelets or discs (column 4, lines 32-36). In the case where the claimed ranges overlap or lie inside ranges disclosed by the prior art, a *prima facie* case of obviousness exists. See MPEP § 2144.05.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claims 9 and 10 above, and further in view of Rongti et al.

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al view of Feldstein does not disclose the concentration of tin as claimed. Rongti et al discloses that Sn addition to Ti can improve the wetting behavior of Ti on substrates and discloses a composition of 10% Sn (pages 21 and 24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a 10% Sn composition as taught by Rongti et al in the alloy of Lorenz et al in view of Feldstein to improve wetting.

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claims 9-11 above, and further in view of the CRC Handbook.

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein does not disclose the operating temperatures as claimed. The CRC Handbook discloses the melting temperature of Ti (≈ 3020 °F) and Sn (≈ 448 °F). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the operating temperature would be between the melting temperatures of Ti and Sn, since the alloying element melts and the main element, i.e. Ti, remains in the solid state.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claim 9 above, and further in view of Clement et al.

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein does not disclose the alloy concentration as claimed. Clement et al discloses a process for repairing and refacing titanium aluminide articles by preparing a mixture of powders consisting of 40-90% powder A and 10-2=40% powder B (abstract). Powder A is the same composition as the article to be refaced or repaired, whereas

powder B is Cu15 Ni15, balance Ti (column 4, lines 13-59). An obvious advantage of the addition of the Ti-15Cu-15Ni alloy is the lower melting temperature relative to the alloys disclosed in Clement et al. This feature would enable repair and refacing to be made at a temperature less than that of the article to be repaired. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 10 and 40% of Ti-15Cu-15Ni as taught by Clement et al to the alloy composition of Lorenz et al in view of Feldstein to enable deposition to be made at lower temperatures.

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein and Clement et al as applied to claims 9 and 14 above, and further in view of the CRC Handbook.

Lorenz et al in view of Feldstein and Clement et al discloses the invention substantially as claimed. However, Lorenz et al in view of Feldstein and Clement et al does not disclose the operating temperature as claimed. The CRC Handbook discloses the melting temperature of Ti ($\approx$ 3020 °F) and Sn ($\approx$ 448 °F). It would have been obvious to one of ordinary skill in the art at the time the invention was made that the operating temperature would be between the melting temperatures of Ti and Sn, since the alloying element melts and the main element, i.e. Ti, remains in the solid state.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lorenz et al in view of Feldstein as applied to claim 1above, and further in view of Weiman (US 5,211,776).

Lorenz et al in view of Feldstein discloses the invention substantially as claimed. Though Lorenz et al teaches using isostatic pressing in column 3, lines 63 and 64, Lorenz et al in view of Feldstein does not each that the pressurizing causes the sintered part to have a

substantially homogeneous structure and to be densified as in Claim 25. Weiman teaches manufacturing metal composite materials. An isostatic hot pressing method ensures that the resulting composite is homogeneous and densifies a product (column 8, lines 51-63). It would have been obvious to one of ordinary skill in the art at the time the invention was made to expect that the isostatic pressing taught in Lorenz et al would result in the properties discussed in Weiman, since both Lorenz et al and Weiman substantially teach the same endeavor of powder metallurgical processing.

Response to Arguments

Applicant argues that the examiner does not show how Feldstein teaches the steps of spreading, directing, and resolidifying. Those steps are addressed in this office action. Regarding the energy beam, an energy beam is a source of heat. Any energy source that can perform the same function of localized melting reads on the claimed heat source.

Conclusion

The examiner notes the following regarding withdrawn Claims 26 and 28: Applicant provides support for the forming the final part, i.e. sintered part, as an intricate structure with complex surfaces cavities and channels in [0023]. However, applicants do not provide support for the forming the green part as an intricate structure with complex surfaces cavities and channels.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to TIMA M. MCGUTHRY-BANKS whose telephone number is (571)272-2744. The examiner can normally be reached on M-F 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

/T. M. M./
Examiner, Art Unit 1793
7 July 2008